TT 67 —51231

From: Trudy Nauchno-Issledovatel'skogo Instituta Sel'skogo Khozyaistva Krainego Severa, Vol. 11:41 —50. 1963.

L. V. Makhaeva

THE GRAZING AREA REQUIRED FOR DEER

(O razmerakh ploshchadei vypasa, potrebnykh dlya olenei)

Translated from Russian
IPST Cat. No. 1894

Available from
U.S. DEPARTMENT OF COMMERCE
Clearinghouse for Federal Scientific and Technical Information
Springfield, Va. 22151

Published Pursuant to an Agreement with
The U.S. Department of the Interior and
The National Science Foundation, Washington, D.C., by the
Israel Program for Scientific Translations
Jerusalem 1967

Trudy Nauchno-Issledovatel'skogo Instituta Sel'skogo Khozyaistva Krainego Severa, Vol. 11 : 41 — 50. 1963.

THE GRAZING AREA REQUIRED FOR DEER

(O razmerakh ploshchadei vypasa, potrebnykh dlya olenei)

L. V. MAKHAEVA

Scientific Research Institute of Agriculture
of the Far North

The area required for deer pasturage is a variable depending on the season, type of vegetation, available reserve and accessibility of feeds, and methods of herd-tending. For determining the capacities of pastures and evolving rational usage techniques, data on the areas of pasturage are required.

Very little information on the dimensions of pasture areas has been published. The data supplied by K.N.Igoshina and E.F.Florovskaya (1939), M.N.Avramchik (1939), and V.N.Andreev (1940) deal with the lower Pechora area, the Northern Urals and Yamal.

In addition to results of my own investigations on the Murmansk Region, data provided by land settlement expeditions which operated in the years 1949 to 1958 in Komi ASSR, in the Nenets and Yamal-Nenets national districts, in Yakutia and the Chukchi Peninsula are used in this article.

Outside the Soviet Union information on deer pasture areas is found only in Palmer's work (1926).

Season, character of vegetation, stock of feeds and their accessibility, and herd-tending methods were examined for their effects on pasture size.

Seasonal alternation in the Far North greatly influences the composition and accessibility of feeds for reindeer. When snow covers the pasture, deer expend much energy on obtaining their feeds from under the snow. A deep, loose snowcover greatly hampers their movements.

This leads to decreased movements ('locomotive activity' — coined by Davydov, 1958) of deer on the pasture. In winter, according to Davydov, movements on the pasture are cut down to 3 km per 24 hours, whereas in early autumn before the appearance of snow deer move 25 km in 24 hours, and in spring, 10 km.

The size of pasturage area depends upon the locomotive activity of deer. The seasonal changes in locomotive activity (which consequently affect pasturage area size) are closely connected with the degree of accessibility of feeds. Food abundance not only changes with the seasons but also during each season.

As an example, the changes in the food accessibility and pasturage areas in winter will be followed. During the winter the accessibility of food is

determined by the depth and density of the snow. Early in winter (December) the depth of snow on forest pastures in Murmansk Region, according to our data, is 20—40 cm. While feeding on pasture, deer cover about 6 km in 24 hours (Davydov, 1958). The 24-hour pasturage areas of pine—lichen forest areas range from 0.06 to 0.7 ha. In mid-winter (February—March) the depth of snow on pastures of this type increases to 50—55 cm, and the 24-hour pasturage areas decrease to 0.04 ha. At the end of March and in the first half of April, when the snow depth in pine—lichen forests increases to 60 cm with a density of 0.21, foods are even less accessible. The pasturage areas per deer per 24 hours in the late winter season on forest pastures are about 0.01-0.03 ha.

In spring, foods become increasingly accessible due to the thawing of the snow. With the appearance of thawed patches, the pasturage areas sharply increase to 0.12 ha.

In the Murmansk Region herds pasture in the spring on mountain tundras. Here the dense snow (with a frozen crust) does not impede their movements. Later, when the area of thawed patches increases, the locomotive activity of deer decreases and with it the 24-hour pasturage area per deer decreases to half.

In summer the locomotive activity of deer is affected by bloodsucking insects. In the period of greatest swarming of mosquitoes, deer move over scores of kilometers, covering great areas. At this period insect protection measures, such as botfly treatment, protective sheds, smoke boxes and pasturing on windswept pastures assume great importance. In the fall, pasturage areas may increase when mushrooms are abundant since deer disperse over the pasture in search of this delicacy.

The type of vegetation influences the size of the pasturage area as well. This effect is difficult to demonstrate since different vegetational covers offer different food stocks and these two factors are closely interrelated. A comparison of forest and mountainous tundra pastures in the Murmansk Region, which have similar food stocks, show that the 24-hour pasturage area per deer on forest pastures is approximately 0.01 ha smaller than on mountainous tundras (Table 1). This difference may be due to the greater density of snow on the mountain pastures (0.4 according to my data), resulting in increased locomotive activity.

The food reserve has a considerable effect on pasturage area. In winter, deer on poor pastures are forced to graze on two to three times the area grazed in rich pastures. Pasture areas in the Murmansk Region in winter vary from 0.01 to 0.02 ha when the reindeer moss cover is 35%; when the reindeer moss cover is lower (20—30%), the pasturage area is 0.03—0.07 ha.

According to V. N. Andreev (1948), the 24-hour pasturage area per deer in the lower Pechora area in mid-winter dependent on food stocks is as follows:

where reindeer moss cover is 25—50%, the area is 0.04 ha;
" " " " "15—25%, " " " 0.09 ha;
" " " " "10—15%, " " " 0.14 ha.

The pasturage area may also vary according to the location of feeding lots. Given a sufficient general supply of foods for the winter pasture, the

daily pasturage area is on the average greater by 0.01 ha where feeding lots are scattered than where feeding lots are more concentrated.

Methods of herd maintenance exert the greatest influence on pasture size. In the conditions prevailing in Murmansk Region where herds are kept at the same place for many days, the useful pasturage area in winter decreases by a factor of 3—4. This implies that the herd reuses daily the same paths with the resulting superimposition one upon the other. This is particularly seen when herds are detained on mountainous tundra pasture where facility of movement is restricted by the terrain. During the first 24 hours of grazing deer usually cover the entire area allotted, later repeating the same itinerary many times. The resultant average 24-hour pasturage area on mountainous tundra is therefore smaller than on the forest pastures. In the winter deer pasture at the same place for long periods because herdsmen restrain their movements. The average 24-hour pasturage area may therefore depend on random factors. The longer a herd pastures at the same place, the more the foods at the feeding sites are depleted.

Deliberate crowding of the herd decreases the pasturage area several times (for Murmansk Region, I observed 1.5—9-fold decreases). On the other hand, lax control of the deer by herdsmen allows for increased pasturage areas. Especially large pasturage areas are covered by unescorted deer. An experiment of such maintenance in a transport herd numbering 120 head in early winter resulted in a diurnal pasturage area of 0.18 ha per deer. This is about three times the area used by an escorted herd pasturing on similar grounds.

The results of a special study (made in 1956—1958) of the exploitation of winter pasture feeds by herds of various sizes in the Murmansk Region are given in Table 1.

These observations led to the conclusion that pasturage area per deer does not depend on the size of the herd. This conclusion is confirmed by data obtained by the land settlement expeditions.

Measurements of pasturage areas covered by herds in other regions of the Far North (Table 2) justified the conclusion that the herd size does not affect the size of the pasturage area.

Observations show that small unsupervised herds use greater pasture areas than large escorted herds. In these cases, the determinative factor is the method of pasturing and not the size of the herd.

The factors reviewed affect in an interrelated manner the area employed for pasturage.

In determining the normative sizes of pasturage areas, that complex of factors assuring the most rational utilization of foods must be taken into account. The maintenance of a herd without change at the same place results in a decrease of the available pasture, since under these conditions there is excessive trampling of foods. Consequently, the size of the pastured area enables one to judge the degree of food utilization. On smaller pasturage areas (Table 2) the degree of utilization increases. No proportional relationship exists, as food stocks differ, but under such conditions increases in the area trampled down in feeding have often been observed.

Andreev (1954) maintains that, in order to conserve most of the nutritive reindeer moss, no less than 40% of the pasture area should

be grazed. At the same time, this would assure superficial cropping of reindeer moss.

TABLE 1

Trail No.	Dates pastures were used	No. of days of pasturage	Size of herd (head)	Type of pasture	24-hr pasturage area per deer (in ha)	Reindeer moss cover growth/density
1	15–23/2	9	3000	Pine, pine–birch–lichen, spruce–moss forests	0.040	45/60
2	12/3–1/4	21	1600	Lichen tundras	0.027	60/40
3	12–14/12	3	2020	Sphagnum–sedge bogs with lichens, grassy birch woods	0.060	–
4	15–19/12	5	2020	Pine–lichen, spruce–moss woods, sphagnum bogs	0.068	30/40–50
5	11–20/2	10	5759	Birch–lichen brush, spruce–moss woods, sphagnum–sedge bogs	0.019	50/70
6	5–8/3	4	2000	Lichen-tundras	0.029	–
7	4–19/3	16	1600	Pine–lichen, spruce–moss woods, mixed woods, bogs, burnt-out areas	0.028	60/50
8	22/3–2/4	12	1192	Pine–lichen, spruce–birch–moss woods	0.009	60/60
9	9–16/4	8	2700	Sphagnum–sedge bogs, spruce–moss woods, even marshes	0.021	15/20
10	19–24/4	6	946	Lichen tundras	0.126	35/25
11	19/4–2/5	14	460–650	" "	0.057	30/20
12	16–18/3	3	900	Birch–pine–lichen woods	0.020	40/50–60
13	19–29/3	11	900	Lichen tundras, birch–lichen brush	0.018	60/50
14	10/4	1	960	Lichen tundras, birch–lichen brush, spruce–moss woods	0.064	30/60
15	11/4	1	960	Pine–lichen, spruce–moss woods	0.058	30/60
16	11–16/4	6	970	Lichen tundras, birch brush, spruce–moss woods	0.024	50/60
17	22–24/4	3	1000	Lichen tundras	0.0115	30/40
18	26–28/4	3	1000	" "	0.032	40/50
19	6–8/5	3	830	" "	0.095	–
20	22–24/12	3	120	Pine–lichen, birch–lichen, and spruce–moss woods	0.180	30/40

By using suitable methods of maintaining deer it is possible to regulate the degree of food depletion, as well as the size of the pasturage area. By these means the capacity of pasture to support a given number of deer is conserved. One of the most effective techniques is changing pastures every 24 hours. Superficial cropping of feeds is also achieved by pasturing animals in winter along an extended front. This prevents repeated grazing at the same spots.

Other pasturing techniques which tend to conserve pasture capacity and ensure the most effective utilization of pastures have been worked out by the leading deer-breeders.

TABLE 2

Place of investigation	Size of herd	No. of days of pasturing	Type of pasture	Season	24-hr pasturage area per deer (in ha)
Yakut ASSR, Nizhnekolymskii District	857–5030	17	Tundra	Early spring	0.049
Yakut ASSR, Allaikhovskii District	1046	9	Forest-tundra	" "	0.028
	770	4	" "	" "	0.125
	1046	5	Marshes	" "	0.057
	770	7	"	" "	0.037
					45
Yamal	1200	32	Forest-tundra	Winter	0.140
	2800	6	Tundra	"	0.040
Yakut ASSR, Nizhnekolymskii District	1370	13	Forest-tundra	"	0.017
	2800	6	" "	"	0.054
Tomponskii District	500	6	" "	"	0.211
	220	3	" "	"	0.225
	200	6	" "	"	0.136
Komi ASSR, Ust'-Usa District	500	52	" "	"	0.076
	900	6	" "	"	0.038
	600	6	" "	"	0.096
	1750	3	Woods	"	0.030
	2000	5	"	"	0.033
Komi ASSR, Izhma District	2300	3	"	"	0.034
	1200	2	"	"	0.055
	500	6	"	"	0.035
	350	6	"	"	0.023
	250	2	"	"	0.041
	230	8	"	"	0.045
Yakut ASSR, Nizhnekolymskii District	2800	14	Tundra	"	0.058
	200	10	Forest-tundra	Late autumn	0.214
	2300	—	Tundra, marshes	Early "	0.006
	1300	—	Marshes, tundra	Summer	0.095

From Tables 1 and 2 some idea of the minimum and maximum daily pasturage area per deer in different seasons can be gained. In winter these values fluctuate mostly within the range of 90 m^2 to 1000 m^2, and only exceed this in isolated cases. The minimum area, according to my measurements, allowing for permissible degree of lichen depletion in pine–lichen woods and birch copses, is 0.02 ha. This figure may be regarded as the minimum pasturage area for one deer in 24 hours in winter in the forested tundra and forest zone of Murmansk Region. In cases where a smaller area was used, food at the feeding spots was depleted and excessively cropped (up to 90% of the height of reindeer moss). A maximum pasturage area of 0.18 ha was obtained on forest pastures in the Murmansk Region when herds being transported were allowed to graze freely. This was 0.225 ha in the Komi ASSR on the forested tundra pastures according to

data of the land settlement expedition. This corresponds roughly to Andreev's data for the tundra zone (1954). The maximum size of daily pasturage area per deer for forested tundra and forests may be considered to be 0.20 ha.

In the spring, on mountainous tundra pastures the area norms are: minimum, 0.03 ha; maximum, 0.65 ha (Table 2).

In the summer in the tundra zone of Yakutia the minimum is 0.09 ha and the maximum, 0.10 ha. In the Northern Urals area: 0.33 and 0.53 ha, respectively; in autumn, 0.06 and 0.214 ha. The maximum value for the late autumn closely approximates the maximum value for early winter, 0.225 ha.

These maximum-minimum values can be used as a guide to determine the seasonal pasturage requirements. At the same time local peculiarities of pasturing techniques, the distribution and quality of the feeds, and the pasture rotation period must be taken into account.

In Murmansk Region, according to my data, one deer requires for the winter season 5.8 ha in forest; 4.4 ha in forest-tundra, and 3.7 ha in mountainous tundra. For the Urals Andreev (1940) found the values close to those described by Igoshina and Florovskaya (1939), 7 and 7.5 ha respectively.

In the lower Pechora area, the land settlement expedition obtained a range of values from 4.2 to 12.2 ha.

These pasturage sizes represent the actual requirements of deer for one year only. When calculating for biennial or triennial pasture rotation, the area should be multiplied accordingly.

On the Chukchi Peninsula, taking into account pasture rotation, the land settlement expedition's estimate was 15.5 ha pasturage area in winter for one deer.

According to my data, one deer uses 3.1 ha in early spring on mountainous tundra pastures of Murmansk Region; according to Igoshina and Florovskaya, 6 ha in the Polar Urals; according to Andreev, 4 ha throughout the spring on the Yamal Peninsula. One deer's requirement in early spring on the Chukchi Peninsula is 8.3 ha, in late spring 2.6 ha, that is, 10.9 ha for the whole spring season.

Known pasturage area norms for summer are few: 7.3 ha for the Chukchi Peninsula, 5.1 ha for Yakutia, and 24.6 ha for the Northern Urals (data of the Scientific Agricultural Research Institute of the Far North). In the Polar Urals, according to Igoshina and Florovskaya (1938) and Andreev (1940), the summer pasturage area for one deer is 9 ha.

Autumn, like spring, is subdivided into two periods. On the Chukchi Peninsula in early fall, the area per deer is 5.8 ha, in late autumn 4.3 ha (rotation of pastures taken into account). In Yakutia, a deer requires during the entire autumn 4.3 ha pasture. In the Polar Urals the value is 10 ha (Igoshina and Florovskaya, 1938); on the Yamal, 4 ha (Andreev, 1940).

The found maximum-minimum pasturage areas are utilized when estimating the accessibility of pastures and for correcting estimated data of pasture capacity to support a given number of deer. The pasture capacity is calculated by the method suggested by V.N. Andreev (1940), using as a starting point the available food. The theoretical estimates of pasture capacity as they are may be used as a check upon the practical data, which should conform to the theoretical estimates. For example,

for trail No. 1 (Table 1) the theoretical capacity of pasture (3,200 deer) and the actual (3,000 deer) are practically the same. For trail No. 2 the actual load exceeded the theoretical twofold; this was impermissible overloading of the pasture and resulted in excessive depletion of reindeer moss (to 80% of the lichen's height). For trail No. 5 the actual and theoretical values again almost coincide (2,500 and 2,280 deer).

This method for calculating pasture capacity provides a tool for the conservation of reindeer moss. With such techniques only the annual growth is cropped by deer. The examples, which are taken from practical exploitation, bear witness to the realistic and adequate application in deer farming of this method.

Every area of the Far North has its own specific character of pastures, and methods of tending deer, so that the dimensions of the required pasturage areas vary for each area.

To obtain data relating to the norms of deer pasturage areas, the practical utilization of pastures as well as their accessibility have to be studied in each region.

BIBLIOGRAPHY

Andreev, V. N. Pastbishcha i pastbishcheoboroty v olenevodstve (Pastures and Rotation of Pastures in Deer-breeding).—In: Sbornik Voprosy olenevodstva na Krainem Severe, Moskva, Vsesoyuznaya Akademiya Sel'skokhozyaistvennykh Nauk im. V.I. Lenina. 1940.

Andreev, V.N. Korma i pastbishcha severnykh olenei (Feeds and Pastures of Reindeer).—Severnoe olenevodstvo, Moskva, Sel'khozgiz. 1948.

Andreev, V.N. Prirost kormovykh lishainikov i priemy ego regulirovaniya (Growth of Forage Lichens and Methods of Regulating It).—Trudy Botanicheskogo Instituta im. Komarova, Akademiya Nauk SSSR, seriya III (Geobotanika), No. 9. 1954.

Andreev, V.N. Osnovy kormleniya severnykh olenei. Osnovy organizatsii pastbishchnogo khozyaistva (Elements of Reindeer Feeding. Elements of Pasture Economy Organization).— Chapters 4 and 6. In book: Druri, I.V. "Olenevodstvo", Sel'khozgiz. 1955.

Avramchik, M.N. Zimnee pitanie olenei na Yamal'skom severe (Winter Feeding of Deer in Northern Yamal).—Trudy Nauchno-Issledovatel'skogo Instituta Polyarnogo Zemledeliya, Zhivotnovodstva i Promyslovogo Khozyaistva, seriya Olenevodstvo. No. 4. 1939.

Davydov, A.F. Dvigatel'naya aktivnost' severnogo olenya v svyazi s usloviyami vypasa (Locomotive Activity of Reindeer in Relation to Pasturage Conditions).—Opyt Izucheniya Regulyatsii Fiziologicheskikh Funktsii, Vol. 4. 1958.

Igoshina, K.N. and E.F. Frolovskaya. Ispol'zovanie pastbishch i vypas olenei na pripolyarnom Urale (The Use of Pastures and Deer Pasturing in the Subpolar Urals Area).—Trudy Nauchno-Issledovatel'skogo Instituta Polyarnogo Zemledeliya, Zhivotnovodstva i Promyslovogo Khozyaistva, seriya Olenevodstvo, No. 8. 1939.

Manuscripts:

Otchety geobotanikov Mezhoblastnoi zemleustroitel'noi ekspeditsii za 1951—1954 gg. (Reports of Geobotanists of the Interregional Land Settlement Expedition for 1951 — 1954).

Otchety geobotanikov Yakutskoi zemleustroitel'noi ekspeditsii za 1958 g (Reports of Geobotanists of the Yakutsk Land Settlement Expedition for 1958).

Otchet sotrudnika Yamal'skoi sel'skokhozyaistvennoi opytnoi stantsii M. M. Antonovoi za 1957 g (Reports of Associate Member Antonova, M. M. of the Yamal Agricultural Experimental Station for 1957).

Otchet sotrudnika Nauchno-Issledovatel'skogo Instituta sel'skogo khozyaistva Krainego Severa V. A. Kovakinoi za 1958 g. (Report of Associate Member Kovakina, V. A. of the Scientific Research Institute of Agriculture of the Far North for 1958).